

## Appendix II: Risk Factors for Selected Cancer Types and Reviewers of Risk Factors

This Appendix contains a list of risk factors for thirteen types of cancer. The list briefly summarizes available information from the scientific literature. The list was last revised in 2000. Cancers are complex diseases, many of which have multiple factors that may contribute to their development. It should be noted that there is no single agreed-upon list of risk factors -- even the experts may disagree. This list should be viewed only as a starting point for the interested reader, and should not be viewed as constituting a definitive or comprehensive summary of cancer risk factors. Future risk factor lists may change as new research findings emerge.

The list separates those characteristics for which research clearly indicates a strong association in the development of the cancer ("Risk Factors") from those characteristics for which weaker associations exist ("Possible Risk Factors") or which are now coming under investigation ("Under Investigation").

- Bladder, Urinary
- Breast
- Cervix Uteri (cervical cancer)
- Colon / Rectum
- Leukemia
- Lung and Bronchus
- Melanoma of Skin
- Non-Hodgkin's Lymphoma
- Oral Cavity and Pharynx
- Ovary
- Prostate
- Testis
- Uteri, Corpus and Uterus, Nos (uterine cancer)

For additional information on cancer risk factors or prevention, you may wish to contact the following:

- Cancer Information Service (National Cancer Institute): 1-800-4-CANCER
- Cancer Response Line (American Cancer Society): 1-800-ACS-2345

In addition, the following selected Internet websites provide information on cancer. Many of these also provide links to other sites (not listed) which may be of interest.

- [Massachusetts Department of Public Health](#)
- [American Cancer Society](#)
- **Centers for Disease Control and Prevention**
  - [Home Page](#)
  - [Cancer Prevention and Control Program](#)
- **National Cancer Institute**
  - [Information](#)
  - [CancerLit<sup>®</sup> \(literature\)](#)
  - [SEER data](#)
  - [5-A-Day Program \(nutrition\)](#)
- **Harvard Center for Cancer Prevention**
  - [Home Page](#)
  - [Your Cancer Risk](#)
- [OncoLink](#) (University of Pennsylvania Cancer Center)
- [Cancer News on the Net<sup>®</sup>](#) (information on diagnosis and treatment for cancer patients and their families)
- [National Coalition for Cancer Survivorship](#)

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### **BLADDER, URINARY**

#### **Risk Factors:**

- Age (In Massachusetts, incidence rates increase markedly in the 65 to 74 year age group, and are highest in the 75 years and older age groups.)
- Cigarette smoking
- Excessive use of certain pain medications such as those containing phenacetin
- Treatment with alkylating agent chemotherapy drugs such as Cytosan (cyclophosphamide)
- Having had radiation therapy to the bladder

#### **Possible Risk Factors:**

- Occupations in which workers are suspected of having an elevated bladder cancer risk due to certain chemical exposures include working in the rubber and/or leather industries, dye manufacturing, painters, professional drivers of trucks and other motor vehicles, aluminum workers, machinists, chemical workers, printers, metal workers, hairdressers and textile workers
- Urologic conditions such as urinary tract infections and urinary stasis
- Dietary factors

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### **BREAST**

#### **Risk Factors:**

- Age (In Massachusetts, incidence rates increase markedly in the 45 to 64 year age group, and are highest in the 75 years and older age groups.)
- Family (mother, sister or daughter) history of breast cancer, especially if it was detected pre-menopausally (before the change of life)
- High-dose radiation therapy to the chest, especially from age 11 until age 30
- Never giving birth
- First childbirth after age 30
- Menstruating since age 12 or younger
- Late age (older than 55) at menopause (change of life)
- Having inherited a mutation in breast cancer susceptibility genes such as BRCA1 or BRCA2
- Increasing body fat in post-menopausal women
- Estrogen taken post-menopausally (after the change of life)
- More than three alcoholic drinks per day

#### **Possible Risk Factors:**

- Diet low in fruits and vegetables

#### **Under Investigation:**

- Pesticide exposure
- Other environmental exposures

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### CERVIX UTERI (cervical cancer)

#### Risk Factors:

- Age (In Massachusetts, incidence rates are highest in the 45 years and older age groups.)
- Certain types of human papilloma virus (HPV, the virus that causes genital warts)
- Sexual intercourse before age 19
- Multiple sexual partners
- Unprotected intercourse (having sex without a condom)
- Smoking
- Infection with HIV (human immunodeficiency virus, the virus that causes AIDS)

#### Possible Risk Factors:

- Too little vitamin A, vitamin C and/or folic acid in the diet
- Exposure to secondhand smoke (other people's smoke)
- Use of the medication *diethylstilbestrol (DES)* during pregnancy is associated with later vaginal clear cell adenocarcinoma (a form of cervical and vaginal cancer) in the female children of those pregnancies.

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### **COLON / RECTUM**

#### **Risk Factors:**

- Age (In Massachusetts, incidence rates increase markedly in the 45 to 64 year age group, and continue to increase markedly in the 65 to 74 year and 75 to 84 year age groups.)
- A personal history of colorectal polyps or colorectal cancer
- Family history of colorectal cancer or polyps, including the various polyposis syndromes such as familial adenomatous polyposis, Gardner's Syndrome or Peutz-Jeghers Syndrome
- Personal history of inflammatory bowel disease such as ulcerative colitis or Crohn's Disease
- Personal history of ovarian, breast or endometrial cancer
- Diet high in red meat, and low in fruits, vegetables and folic acid
- Physical inactivity

#### **Possible Risk Factors:**

- Alcohol, especially beer
- Smoking
- Increasing body fat

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### **LEUKEMIA**

#### **Risk Factors:**

- Exposure to ionizing radiation
- Exposure to benzene
- Treatment with chemotherapy drugs (especially alkylating agents)
- Certain genetic conditions such as Down's syndrome
- Exposure to ethylene oxide

#### **Possible Risk Factors:**

- Exposure to low level solvent and metal mixtures
- Smoking

#### **Under Investigation:**

- Exposure to electromagnetic fields (e.g., from power lines)

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### LUNG and BRONCHUS

#### Risk Factors:

- Smoking  
**Note:** 85% of all lung cancers are caused by smoking. The risk of lung cancer is *10 times greater* for persons who smoke up to one pack of cigarettes a day and *20 times greater* for persons who smoke more than one pack of cigarettes a day than for persons who do not smoke.
- Occupational, and in some cases environmental, exposures (e.g., asbestos, metals)
- Exposure to secondhand smoke (other people's smoke)

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### MELANOMA of SKIN

**Note:** *changing or changed moles, or new moles which appear after age 30 that itch and are tender* are early, potentially malignant lesions, and should be examined by a health care professional.

#### Risk Factors:

- Age (In Massachusetts, incidence rates begin to increase markedly in the 45 to 65 year age group, and are highest in the 75 to 84 year age group.)
- One or more large or unevenly colored lesions such as:
  - Dysplastic mole(s), with or without a family history of melanoma
  - Lentigo maligna
- Familial atypical mole and melanoma syndrome
- Giant congenital melanocytic nevi (pigmented patches of skin)
- Nevus (birthmark) since birth
- Caucasian
- Previous melanoma
- Family history of melanoma
- Immunosuppression (when the body's defenses are weakened, such as after transplant surgery)
- Sun sensitivity
- Repeated sunburns, especially as a child
- Easily sunburned
- Freckling
- Unable to tan easily



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### **NON-HODGKIN'S LYMPHOMA (now known as non-Hodgkin lymphoma)**

#### **Risk Factors:**

- Age (In Massachusetts, incidence rates begin to increase in the 45 to 65 year age group, and are highest in the 75 to 84 year age group.)
- Abnormalities of the immune system, either congenital or resulting from suppression due to organ transplantation or disease
- Infection with HIV (human immunodeficiency virus, the virus that causes AIDS)
- Exposure to radiation or chemotherapy
- Exposure to certain herbicides

#### **Possible Risk Factors:**

- Smoking
- Other chemical exposures

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### **ORAL CAVITY and PHARYNX**

#### **Risk Factors:**

- Tobacco use (including cigarettes, pipes, cigars, chewing tobacco and snuff)
- Heavy alcohol use
- Age (In Massachusetts, incidence rates begin to increase in the 45 to 64 year age group, and are highest in the 75 to 84 year age group.)
- Poor nutrition, especially chronic iron deficiency

#### **Possible Risk Factors:**

- Chronic irritation of the mouth due to ill-fitting dentures or broken teeth
- Poor oral hygiene

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### **OVARY**

#### **Risk Factors:**

Age (In Massachusetts, incidence rates increase markedly in the 45 to 64 year age group, and are highest in the 65 to 74 year age group.)

- Never giving birth
- Personal history of endometrial (lining of the uterus), colon or breast cancer
- Family history of ovarian cancer (mother, sister or daughter)
- Having one of three inherited ovarian cancer conditions:
  - breast-ovarian cancer syndrome
  - site-specific ovarian cancer syndrome
  - hereditary nonpolyposis colorectal cancer or Lynch II syndrome (includes early-onset colorectal cancer, endometrial cancer, breast cancer and ovarian cancer)
- Never having used oral contraceptives, or having used oral contraceptives for fewer than five years
- Caucasian

#### **Possible Risk Factors:**

- Fertility drugs
- Use of talc powder containing asbestos fibers in the perineal or external genitalia area
- High fat diet

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### **PROSTATE**

#### **Risk Factors:**

- Age (In Massachusetts, incidence rates begin to increase markedly in the 45 to 64 year age group, and are highest in the 65 to 74 year age group.)
- Family history of prostate cancer
- Hormonal factors
- African-American

#### **Possible Risk Factors:**

- Alcohol consumption
- Having a history of benign prostate disease
- Smoking
- Physical inactivity
- Diet high in fat

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### **TESTIS**

#### **Risk Factors:**

- Age (In Massachusetts, incidence rates are highest in the 20 to 44 year age group.)
- Undescended testicle

#### **Possible Risk Factors:**

- Inguinal hernia
- Testicular trauma
- Familial factors
- Occupations related to leather processing

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### **UTERI, CORPUS and UTERUS, NOS (uterine cancer)**

#### **Risk Factors:**

- Age (In Massachusetts, incidence rates are highest in the 45 years and older age groups.)
- Personal history of colon and/or breast cancer
- Family history of uterine cancer
- Being more than 20 pounds overweight
- Never giving birth
- Presence of estrogen-producing ovarian tumors
- Postmenopausal (change of life) use of estrogen without progesterone
- Tamoxifen (a drug given to women who have had breast cancer to lower the risk of recurrence)
- Late age (older than 55) at menopause (change of life)

#### **Possible Risk Factors:**

- Diet high in fatty foods
- Hypertension (high blood pressure)
- Diabetes (high blood sugar)
- Chronic anovulation (ovaries do not produce eggs)
- Menstrual problems
- Radiation therapy to the pelvis
- Malignant tumors on the ovaries
- Never having used oral contraceptives, or having used oral contraceptives for fewer than five years

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This Appendix was assembled under the auspices of the American Cancer Society (New England Division) through seeking the advice of leading cancer experts. The following clinicians, researchers and public health professionals reviewed the risk factors for the type(s) of cancers indicated:

|   |   |
|---|---|
| Ross Berkowitz, MD (ovarian, uterine)     | Robert Krane, MD (testicular)                 |
| Cynthia Boddie-Willis, MD, MPH (prostate) | Frederick Li, MD (all types)                  |
| Risa Burns, MD (breast, cervical)         | John Lisco, MPH (colorectal)                  |
| Richard Clapp, ScD (all types)            | Robert Mayer, MD (colorectal)                 |
| Graham Colditz, DrPH (colorectal)         | Kenneth Miller, MD (leukemia)                 |
| Suzanne Condon, MS (all types)            | Michael Monopoli, DMD (oral)                  |
| Greg Connolly, DMD (lung)                 | Nancy Mueller, ScD (non.Hodgkin's lymphoma)   |
| Daniel Cramer, MD (ovarian)               | J. David Naparstek, ScM, CHO (all types)      |
| Letitia Davis, ScD (all types)            | Robert Osteen, MD (breast)                    |
| Catherine DuBeau, MD (prostate)           | James Petros, MD (colorectal)                 |
| Kathleen Egan, PhD (breast)               | Marianne Prout, MD, MPH (all types)           |
| Richard Fabian, MD (oral)                 | Lowell Schnipper, MD (non.Hodgkin's lymphoma) |
| Marc Garnick, MD (prostate, testicular)   | Paul Schroy, MD, MPH (colorectal)             |
| Alan Geller, RN, MPH (melanoma)           | Ellen Sheets, MD (cervical)                   |
| Annekathryn Goodman, MD (uterine)         | William Shipley, MD (bladder)                 |
| Lauren Holm, RN, MSN (all types)          | Art Skarin, MD (lung)                         |
| David Hunter, MD, BS, ScD (all types)     | Arthur Sober, MD (melanoma)                   |
| Joe Jacobson, MD (prostate)               | Bonnie Tavares, MEd (breast, cervical)        |
| Phil Kantoff, MD (bladder, prostate)      | Howard Weinstein, MD (leukemia)               |
| Howard Koh, MD, MPH (melanoma)            | Martha Crosier Wood, MBA (all types)          |

and staff members of the Massachusetts Department of Public Health's Bureau of Environmental Health Assessment (all types), Colorectal Cancer Working Group (colorectal), Skin Cancer Prevention Program (melanoma), and Massachusetts Women's Health Network (breast, cervical).

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